

HighFive PLC

PSS 21H-2Z42 B4

FBM242, Externally Sourced, Discrete Output Interface Module

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*The FBM242 Discrete Output Interface Module contains 16 discrete output channels which are sourced externally.*

#### FEATURES

Key features of the FBM242 modules are:

- ▶ Sixteen discrete outputs
- ▶ Supports discrete output signals at voltages of:
  - 15 to 60 V dc
  - 120 V ac/125 V dc
  - 240 V ac
- ▶ Each input and output is galvanically isolated; group isolated when used with external excitation
- ▶ Compact, rugged design suitable for enclosure in Class G3 (harsh) environments
- ▶ Executes the Discrete I/O or Ladder Logic program, with the following configurable options: Input Filter Time, Fail Safe Configuration, Fail-Safe Fail-Back, and Sustained or Momentary Outputs
- ▶ Various Termination Assemblies (TAs) that contain:
  - Current limiting devices
  - Fuses
  - Relay outputs with external power source, fusing, and power distribution
  - Solid state outputs
  - Redundant power distribution

#### OVERVIEW

The FBM242 Discrete Output Interface Module contains 16 discrete output channels, which are sourced externally, rated up to 2 A at 60 V dc. Associated termination assemblies (TAs) provide for discrete outputs to loads of 2 A at 60 V dc, relay outputs (120 V ac/125 V dc, or 240 V ac), or relay outputs with power distribution and fusing. Each output is fully isolated from other channels and ground.

The module interfaces electrical output signals from a control processor to the field devices. It executes a digital I/O application program, with ladder logic support, and provides a Fail-Safe Configuration option for the outputs.

#### COMPACT DESIGN

The module has a compact design, with a rugged extruded aluminum exterior for physical protection of the circuits. Enclosures specially designed for mounting the FBMs provide various levels of environmental protection, up to harsh environments (Class G3), per ISA Standard S71.04.

#### VISUAL INDICATORS

Light-emitting diodes (LEDs) incorporated into the front of the module provide visual indication of the module operational status, as well as the discrete states of the individual output points.

#### EASY REMOVAL/REPLACEMENT

The module can be removed/replaced without removing field device termination cabling, power, or communication cabling.

#### FIELDBUS COMMUNICATION

A Fieldbus Communications Module or a Control Processor interfaces to the redundant 2 Mbps module Fieldbus used by the FBMs. The FBM242 accepts communication from either path (A or B) of the redundant 2 Mbps Fieldbus — should one path fail or be switched at the system level, the module continues communication over the active path.

#### SECURITY

Field power for contacts or solid state switches is current limited.

#### MODULAR BASEPLATE MOUNTING

The module mounts on a DIN rail mounted Modular baseplate, which accommodates up to four or eight Fieldbus Modules. The Modular baseplate is either DIN rail mounted or rack mounted, and includes signal connectors for redundant Fieldbus, redundant independent dc power, and termination cables.

#### TERMINATION ASSEMBLIES (TAs)

Field I/O signals connect to the FBM subsystem via DIN rail mounted TAs. The TAs used with the FBM242 are described in "TERMINATION ASSEMBLIES" on page 6.

## FUNCTIONAL SPECIFICATIONS

### Output Channels

Sixteen isolated channels.

### Applied Voltage

15 to 60 V dc (maximum)

### Load Current

2.25 A (maximum) per channel

### Load Current-In-Rush

8 A (maximum) for 20 ms per channel at 30°C.  
6.4 A (maximum) for 20 ms per channel at 70°C.

### On-State Voltage Drop

0.2 V (maximum) at 2.25 A

### Off-State Leakage Current

0.1 mA (maximum)

### Inductive Loads

Module output may require a protective diode or metal oxide varistor (MOV) connected across the inductive load.

### Output Channel Isolation

Each channel is galvanically isolated from all other channels and earth (ground). The module withstands, without damage, a potential of 600 V ac applied for one minute between any channel and ground, or between a given channel and any other channel.

### CAUTION

This does not imply that these channels are intended for permanent connection to voltages of these levels. Exceeding the limits for input voltages, as stated elsewhere in this specification, violates electrical safety codes and may expose users to electric shock.

### Communication

Communicates with its associated FCM or FCP via the redundant 2 Mbps module Fieldbus

### Power Requirements

#### INPUT VOLTAGE RANGE (REDUNDANT)

24 V dc +5%, -10%

#### CONSUMPTION (MAXIMUM)

3 W (maximum) at 24 V dc

#### HEAT DISSIPATION (MAXIMUM)

6.5 W (maximum) at 24 V dc (with all outputs at 1.5 A each)

### Calibration Requirements

The module and termination assemblies require no calibration.

#### FUNCTIONAL SPECIFICATIONS (CONTINUED)

##### Regulatory Compliance

###### ELECTROMAGNETIC COMPATIBILITY (EMC)

*European EMC Directive 89/336/EEC*

Meets: EN 50081-2 Emission standard  
EN 50082-2 Immunity standard  
EN 61326 Annex A (Industrial

Levels)

*CISPR 11, Industrial Scientific and Medical (ISM) Radio-frequency Equipment - Electromagnetic Disturbance Characteristics - Limits and Methods of Measurement*

Meets: Class A Limits

*IEC 61000-4-2 ESD Immunity*

Contact 4 kV, air 8 kV

*IEC 61000-4-3 Radiated Field Immunity*

10 V/m at 80 to 1000 MHz

*IEC 61000-4-4 Electrical Fast*

*Transient/Burst Immunity*

2 kV on I/O, V dc power and communication lines

*IEC 61000-4-5 Surge Immunity*

2kV on ac and dc power lines; 1kV on I/O and communications lines

*IEC 61000-4-6 Immunity to Conducted Disturbances induced by Radio-frequency Fields*

10 V (rms) at 150 kHz to 80 MHz on VO, V dc power and communication lines

*IEC 61000-4-8 Power Frequency Magnetic Field Immunity*

30 A/m at 50 and 60 Hz

###### PRODUCT SAFETY - TERMINATION ASSEMBLIES WITH LOW VOLTAGE INPUTS

*Underwriters Laboratories (UL) for U.S. and Canada*

UL/AUL-C listed as suitable for use in Class I, Groups A-D; Division 2; temperature code T4 enclosure based systems. These modules are also UL and UL-C listed as associated apparatus for supplying non-incendive communication circuits for Class I, Groups A-D hazardous locations when connected to specified VA Series<sup>®</sup> processor modules as described in the VA

*Series DIN Rail Mounted Subsystem User's*

*Guide (B0400FA). Communications circuits also meet the requirements for Class 2 as defined in Article 725 of the National Electrical Code (NFPA No.70) and Section 16 of the Canadian Electrical Code (CSA C22.1). Conditions for use are as specified in the VA Series DIN Rail Mounted*

*Subsystem User's Guide (B0400FA).*

*European Low Voltage Directive 2006/95/EC and Explosive Atmospheres (ATEX) directive 94/9/EC*

CENELEC (DEMKO) certified for use in CENELEC certified Zone 2 enclosures and certified as associated apparatus for supplying non-incendive field circuits for Zone 2, Group IIC, potentially explosive atmospheres when connected as described in the VA Series DIN Rail Mounted Subsystem User's Guide (B0400FA). Also see, "Certifications for Termination Assemblies" on page 10.

###### PRODUCT SAFETY - TERMINATION ASSEMBLIES WITH RELAY OUTPUTS OR HIGH VOLTAGE INPUTS

*Underwriters Laboratories (UL) for U.S. and Canada*

UL/AUL-C listed as suitable for use in ordinary locations and compliant with UL 3121, First Edition, and Canadian Standard, C22.2 No.1010.1-92 when connected to specified VA Series processor modules as described in the VA Series DIN Rail Mounted Subsystem User's Guide (B0400FA).

*European Low Voltage Directive 73/23/EEC* Certified for use in ordinary locations and compliant with IEC 61010 when connected as described in the VA Series DIN Rail Mounted Subsystem User's Guide (B0400FA).

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### ENVIRONMENTAL SPECIFICATIONS<sup>(1)</sup>

#### Operating Conditions

##### TEMPERATURE

###### Module

-20 to +70°C (-4 to +158°F)

###### Termination Assembly

###### PVC

-20 to +50°C (-4 to +122°F)

###### PA

-20 to +70°C (-4 to +158°F)

##### RELATIVE HUMIDITY

5 to 95% (noncondensing)

##### ALTITUDE

-300 to +3000 m (-1000 to +10 000 ft)

#### Storage Conditions

##### TEMPERATURE

-40 to +70°C (-40 to +158°F)

##### RELATIVE HUMIDITY

5 to 95% (noncondensing)

##### ALTITUDE

-300 to +12 000 m (-1000 to +40 000 ft)

#### Contamination

Suitable for use in Class G3 (Harsh) environments as defined in ISA Standard S71.04, based on exposure testing according to EIA Standard 364-65, Class III.

#### Vibration

7.5 m/s<sup>2</sup> (5 to 500 Hz)

### PHYSICAL SPECIFICATIONS

#### Mounting

##### MODULE

FBM242 mounts on a Modular Baseplate. The baseplate can be mounted on a DIN rail (horizontally or vertically), or horizontally on a 19-inch rack using a mounting kit. Refer to PSS 21H-2W6 B4 for details.

##### TERMINATION ASSEMBLY

The TA mounts on a DIN rail and accommodates multiple DIN rail styles including 32 mm (1.26 in) and 35 mm (1.38 in)

#### Mass

##### MODULE

284 g (10 oz) approximate

##### TERMINATION ASSEMBLY

###### Compression

127 mm (5.02 in) – 272 g (0.60 lb, approximate)

148 mm (5.75 in) – 285 g (0.65 lb, approximate)

216 mm (8.51 in) – 320 g (0.70 lb, approximate)

###### Ring Lug

196 mm (7.78 in) – 310 g (0.68 lb, approximate)

approximate

321mm (12.64 in) – 600 g (1.6 lb, approximate)

approximate

#### Part Numbers

##### MODULE

P0916TA

##### TERMINATION ASSEMBLIES

Refer to "FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES" on page 8

#### Dimensions - Module

##### HEIGHT

102 mm (4 in), 114 mm (4.5 in) including mounting lugs

##### WIDTH

45 mm (1.75 in)

##### DEPTH

104 mm (4.11 in)

#### Dimensions - Termination Assembly

##### COMPRESSION SCREW

Refer to page 12

##### RING LUG AND KNIFE SWITCH

Refer to page 14

(1) The environment ranges can be extended by the type of enclosure containing the module. Refer to the Product Specification Sheet (PSS) applicable to the enclosure that is to be used.

#### PHYSICAL SPECIFICATIONS (CONTINUED)

##### Termination Cables

###### CABLE LENGTHS

Up to 30 m (98 ft)

###### CABLE MATERIALS

Polyurethane or Low Smoke Zero Halogen (LSZH)

###### TERMINATION CABLE TYPE

Type 4 or type 4H - Refer to Table 1

###### CABLE CONNECTION

37-pin male D-subminiature

##### Construction - Termination Assembly

###### MATERIAL

Polypropylene (PVC), compression

Polyamide (PA), compression

PVC, ring lug

PVC, knife terminal

###### FAMILY GROUP COLOR

Dark blue - discrete

###### TERMINAL BLOCKS

Outputs- 2 tiers (switch and solid state), 3 tiers (relay), 16 positions

Power Distribution - 2 tiers, 4 positions

##### Field Termination Connections

###### COMPRESSION - ACCEPTED WIRING SIZES

*Solid/Stranded/AWG*

0.2 to 4 mm<sup>2</sup>/0.2 to 2.5 mm<sup>2</sup>/24 to 12 AWG

*Stranded with Ferrules*

0.2 to 2.5 mm<sup>2</sup> with or without plastic collar

###### RING-LUG - ACCEPTED WIRING SIZES

#6 size connectors (0.375 in (9.5 mm))

0.5 to 4 mm<sup>2</sup>/22 AWG to 12 AWG

##### Termination Assembly Switching Relays

###### ELECTRICAL SERVICE LIFE

100,000 operations at rated resistive load

5,000,000 operations at no load.

###### 5 A RELAY

*Type*

Single-Pole, Double-Throw, Normally Open (SPDT\_NO)

*Switching Current*

5 A at up to 120 V ac (see \*GENERAL

PURPOSE PLUG-IN RELAY TERMINATION ASSEMBLY SPECIFICATIONS\* on page 15)

#### TERMINATION ASSEMBLIES

##### General Description

Field I/O signals connect to the FBM subsystem via DIN rail mounted termination assemblies (TAs).

Multiple types of TAs are available with FBMs to provide I/O signal connections, signal conditioning, optical isolation from signal surges, external power connections, and/or fusing for protection of the FBM and/or field device as required by the particular FBM. Since these features are built into the termination assemblies (where required), in most applications there is no need for additional termination equipment for field circuit functions such as circuit protection or signal conditioning (including fusing and power distribution).

The DIN rail mounted termination assemblies connect to the FBM subsystem baseplate by means

of removable termination cables. The cables are available in a variety of lengths, up to 30 meters (98 feet), allowing the termination assemblies to be mounted in either the enclosure or in an adjacent enclosure. Refer to \*FUNCTIONAL SPECIFICATIONS - TERMINATION ASSEMBLIES\* on page 8 for termination cable part numbers and specifications.

##### Discrete Outputs

Termination assemblies with discrete outputs support sixteen 2-wire discrete output signals at passive low voltages of less than 60 V dc and active high voltage levels of 120 V ac or 240 V ac. Active termination assemblies support output signal conditioning for FBMs. To condition signals, these termination assemblies provide fuse protection, relays, solid-state